

-5-

REMARKS

Review and reconsideration of the present application is respectfully requested in view of the above amendments and the following remarks.

Upon entry of this amendment, claims 1-5, 7, 16, 18, and 20 remain active in this application. Claims 6, 8-15, 17, 19 and 21 have been cancelled without prejudice.

Claims 1 and 16 have been rejected under 35 USC 112, first paragraph, as failing to comply with the enablement requirement. Accordingly, claims 1 and 16 have been amended to recite an “X-ray” source instead of a “radiation source” in accordance with the Examiner’s suggestion in an earnest attempt to overcome this rejection.

Turning now to applicant’s invention, the specification describes an apparatus and method for the inspection of pipelines or other fluid transport vessels including an X-ray source, a radiation detector, and a positioning system for moving the X-ray source and detector longitudinally and circumferentially with respect to the outer surface of the vessel under inspection. In one aspect of the invention, the positioning means comprises a wheel and carriage system adapted to move the X-ray source and detector in a coordinated manner so that one complete circumferential revolution of the wheel is completed in the time required for the carriage to travel longitudinally a distance equal to the scanning width of the detector.

In another aspect of the invention, the wheel is shaped as a C-ring to allow the positioning means to fit around vessels to be inspected even if the ends of the vessel are not free. An articulating arm is provided to manipulate the C-ring around the vessels to be inspected, allowing the X-ray source and detector to provide full azimuthal coverage with respect to the vessel.

Turning now to this Office Action, the Examiner has rejected claims 1-3, 6-11, and 16-21 under 35 USC §102(b) as being anticipated by U.S. Patent 5,420,427 to Morgan et al. In addition, claims 4, 5, and 12-15 have been rejected under 35 USC §103(a) as being unpatentable over Morgan et al. in view of U.S. Patent 5,014,293 to Boyd et al.

In light of the Office Action, Applicants have amended independent claims 1 and 16 so that they more clearly describe a system which allows the X-ray source and detector to move in a

coordinated manner so that one complete circumferential revolution of the source and the detector is completed in the time required for the detector to travel longitudinally a distance equal to the scanning width of the detector while the source is illuminating an adjacent region of the vessel with X-rays. Support for these amendments can be found throughout the specification, especially paragraph's [0028], [0034], and original claim 21 (cancelled herein).

In addition, dependent claims 4 and 5 have been amended to more clearly define Applicants' C-ring apparatus as disclosed in paragraph [0034] and Fig. 3, wherein the C-arm 80, under the control of the controller 10C, enables the C-ring 4A to move around the vessel to achieve full azimuthal coverage of the area under inspection, wherein the source and detector are permitted to move with respect to the vessel in a coordinated manner so that one complete circumferential revolution of the source and the detector is completed in the time required for the detector to travel longitudinally a distance equal to the scanning width of the detector.

In the Office Action, the Examiner states that Morgan et al. discloses each and every limitation of Applicants' claims 1-3, 6-11, and 16-21. Referring specifically to the rejection of Applicants' claim 21, the Examiner refers us to column 19, lines 20+ of Morgan et al. wherein the specification describes an "Analytic Mode" as one of the options for scanning and inspecting a pipeline. In such "Analytic Mode", the scanning apparatus S is programmed to completely scan one cross-section of the component 18 before the scanning apparatus is longitudinally translated to a second cross section (column 20, lines 36-43; column 22, lines 41-44). As a result, the scanning apparatus S does not move in a coordinated manner with respect to the component such that one complete circumferential revolution of the apparatus is completed in the time required for the apparatus to translate longitudinally a distance equal to the scanning width of the detector as recited in applicant's amended independent claims 1 and 16. Rather, in the "Analytic Mode" of Morgan et al., the apparatus rotates 360° at each longitudinal cross-section before being longitudinally translated to the next cross-section. Accordingly, the scans for one cross-section are completed before beginning a new cross-section (column 20, lines 40-43).

Morgan et al. also describes a “Gauging Mode” as one of the options for scanning and inspecting a pipeline. In such “Gauging Mode”, the scanning apparatus S quickly scans the length of the pipe 18 at one rotational position, then rotates a micro-step 340 before the scanning apparatus travels back again along the same length of pipe. The scanning apparatus S then takes a macro-step 342 and again travels the length of the pipe 18. This process repeats itself until all of the rotational steps 342 and 340 have been taken and the entire length of the pipe is scanned for each rotational position 346 (column 21, lines 17-25). Like the “Analytic Mode” described above, the “Gauging Mode” fails to teach or suggest moving the scanning apparatus S in a coordinated manner with respect to the pipeline such that one complete circumferential revolution of the apparatus is completed in the time required for the apparatus to translate longitudinally a distance equal to the scanning width of the detector as recited in applicant’s amended independent claims 1 and 16.

Therefore, with respect to amended independent claims 1 and 16, Morgan et al. fails to teach or suggest a mode for scanning and inspecting a pipeline wherein the inspection apparatus moves in a coordinated manner so that one complete circumferential revolution of the source and detector is completed in the time required for the detector to travel longitudinally a distance equal to the scanning width of the detector as required in Applicant’s amended claims 1 and 16.

Accordingly, Applicant submits that Morgan et al. fails to teach, disclose or suggest the inspection system as recited in amended independent claims 1 and 16.

Turning now to the Boyd et al. reference, there is described a CT X-ray scanner assembly including a C-shaped gantry for supporting the X-ray source and X-ray detector, whereby the gantry is allowed to fit around objects to be inspected, even if the ends of the object are not free (column 1, lines 65-68; column 2, lines 7-11).

In citing to the Boyd et al. patent, the Examiner correctly notes that the inspection apparatus of Boyd et al. is capable of moving longitudinally and circumferentially with respect to the inspection object, and that the C-shaped gantry is permitted to move around objects when the ends of the object are not free. However, the C-shaped gantry of Boyd et al. does not permit the gantry to rotate 360° about the object being scanned unless the open ends of the gantry are closed with an

accessory segment component 46 (column 3, lines 45-47; column 4, lines 28-33; Fig. 12). In order to permit the gantry to be rotated in the support head through 360° of rotation, the gantry must be closed with a segment 46 which is suitably secured to the open ends of the gantry (column 4, lines 28-33). Once the operator has installed the accessory segment 46, the gantry can then be rotated in the support head through 360° of rotation (column 3, lines 45-47; column 4, lines 28-33).

By requiring the operator to install an accessory segment 46 to permit 360° rotation about the object, the operator is required to interrupt the inspection process and perform the costly and time consuming step of removing the segment 46 to permit the gantry to move around the object when the ends of the object are not free.

In view of the above limitations, it would not have been obvious to one of ordinary skill in the art to incorporate the C-shaped gantry of Boyd to arrive at applicant's invention, because to do so would mean disregarding an essential feature of applicant's invention which is to improve the efficiency of the inspection process by allowing the C-shaped gantry to translate longitudinally around objects when the ends are not free, while at the same time allowing the gantry to move in a coordinated manner so that one complete 360° revolution of the source and detector is completed in the time required for the detector to travel longitudinally a distance equal to the scanning width of the detector. This feature of Applicant's invention thereby eliminates the costly and time consuming step of removing component parts from the inspection equipment in order to move the equipment around objects when the ends of the objects are not free (paragraph [0033]).

Based on the foregoing, Applicants' amended claim 4 now recites an inspection device including a C-ring and an articulating C-arm enabling the apparatus to be turned circumferentially about 360°, thereby providing full azimuthal coverage with respect to the vessel under inspection. In Applicant's invention, the C-arm 80, under the control of the controller 10C, is permitted to translate longitudinally around objects when the ends of the objects are not free, without the necessity of performing the costly and time consuming step of removing component parts of the inspection equipment when the ends of the vessel are not free. In this way, the apparatus of the present invention is permitted to rotate around the vessel to achieve full azimuthal coverage of the vessel

Serial No. 10/646,279

-9-

under inspection, and move around objects when the ends of the objects are not free (paragraphs [0033], [0034]; Fig. 3).

Accordingly, Applicant respectfully submits that Boyd et al., either alone or in combination with Morgan et al., fails to teach, disclose or suggest Applicants' invention as recited in applicant's claims.

For all of the above reasons, it is respectfully submitted that upon consideration of this Amendment, all solicited claims will be deemed to define patentable subject matter. The prompt issuance of a Notice of Allowance is accordingly solicited.

Should the Examiner have any questions or comments regarding this application which may be resolved by a telephone interview, the Examiner is respectfully requested to contact the undersigned at the telephone number below.

Respectfully submitted,

WEGMAN, HESSLER & VANDERBURG

By Andrew Lake  
Andrew Lake  
Reg. No. 53,909

Suite 200  
6055 Rockside Woods Boulevard  
Cleveland, Ohio 44131  
216.642.3342

January 14, 2005